

Customer No.: 31561  
Docket No.: 10545-US-PA  
Application No.: 10/708,664

### **REMARKS**

#### **Present Status of Application**

Claims 1-6, 8-13, 15-17, 22 and 23 remain pending in the application. Claims 1-6, 8-13, 15-17, 22 and 23 are rejected under 35 U.S.C. 112, first paragraph. In addition, claims 1-6, 8-13, 15-17, 22 and 23 are rejected under 35 U.S.C. 102(a) as being anticipated by Kung (US Publication No. 2003/0222352). Applicants have amended specification and independent claims 1 and 8 to more specifically define the present invention. Claims 1-6, 8-13, 15-17, 22 and 23 remain pending and reconsideration of those claims is respectfully requested.

#### **Discussion for 35 U.S.C. 112 rejections**

Claims 1-6, 8-13, 15-17, 22 and 23 are rejected under 35 U.S.C. 112, first paragraph. The Office Action states that "the wetting-barrier layer is specifically defined as nickel while the bump comprises tin material" is un-described subject matter. Applicants respectfully traverse the rejections.

The original independent claim 1 has been amended to state that the wetting-barrier layer is a nickel post. Further, as described in [0028]-[0029], the UBM layer 220 in three-layers has only the Ni layer corresponding to layer 226. The nickel atoms of the wetting-barrier layer 226 of the UBM 220 react slowly with tin atoms in the bumps 230.

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Therefore, in one specific embodiment, the wetting-barrier layer is specifically defines as a nickel post. The wetting-barrier layer is in direct contact with the bump.

In addition, the effect of the present invention to reduce the diffusion of tin atoms in the bump 230 is based on that the nickel atoms react slowly with tin atoms.

**Discussion for 35 U.S.C. 102 rejections**

Claims 1-6, 8-13, 15-17, 22 and 23 are rejected under 35 U.S.C. 102(a) as being anticipated by Kung. Applicants respectfully traverse the rejections.

1. *The wetting-barrier layer is specifically defined as a nickel post with direct contact on the bump*. It should be noted that the nickel atoms in the wetting-barrier layer can reduce the diffusion of the tin atoms in the bump 230 because the reaction between the nickel and tin is slow. As a result, the wetting effect between the UBM layer 220 and the bump 230 can be maintained ([0029]).

2. In re Kung, Kung clearly at least fails to disclose the nickel post as recited in independent claims 1 and 8.

In addition, the Office Action has specifically referred to [0026] of Kung. It should be noted that Kung stats "if major constituents of the wettable layer 216 are copper, nickel, or gold, the tin within the solder bump 18 may easily react chemically

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with copper, nickel, or gold within the under-bump metallic layer 210 ... (Emphasis added)". The term of "major" does not specifically define as nickel. In addition, nickel is just one of the choices.

Further, Kung also discloses that tin may easily react with nickel in one of three choice. The mechanism of Kung and the present invention are different. The present invention is based on the slow reaction between tin atoms of the bump and nickel atoms of the wetting-barrier layer. Kung does not equally disclose the features of the present invention.

3. For at least the foregoing reasons, Applicants respectfully submit that independent claims 1 and 8 patently define over the prior art, and should be allowed. For at least the same reasons, dependent claims 1-6, 9-13, 15-17, and 22-23 patently define over the prior art as well.

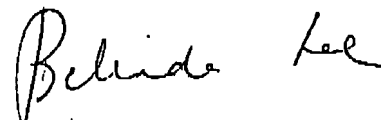
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**CONCLUSION**

In view of the foregoing, it is believed that all pending claims 1-6, 8-13, 15-17, and 22-23 are in proper condition for allowance. If the Examiner believes that a telephone conference would expedite the examination of the above-identified patent application, the Examiner is invited to call the undersigned.

Date: *July 13, 2007*

Respectfully submitted,



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